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AN
ACCOUNT
OF THE
SUGAR MAPLE-TREE,
OF THE
UNITED STATES,
AND OF THE METHODS OF
OBTAINING SUGAR
FROM IT,

TOGETHER WITH OBSERVATIONS UPON THE ADVANTAGES BOTH PUBLIC AND PRIVATE
OF THIS SUGAR,

IN A LETTER TO

THOMAS JEFFERSON, Eſq.

Secretary of State of the United States, and one of the
Vice-Preſidents of the American Philoſophical Society.

Read in the American Philoſophical Society, on the 19th of Auguſt, 1791, and extracted from the Third Volume of their Tranſactions now in the Preſs.

By BENJAMIN RUSH, M. D.

Profeſſor of the Inſtitutes and of Clinical Medicine
in the Univerſity of Pennſylvania.

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Secretary of State of the United States, and one of the Vice-Preſidents of the American Philoſophical Society, by BENJAMIN RUSH, M. D. *Profeſſor of the Inſtitutes and of Clinical Medicine in the Univerſity of Pennſylvania.*

Extracted from the Third Volume of the Tranſactions of the American Philoſophical Society, now in the Preſs, and publiſhed at the requeſt and for the uſe of a number of reſpectable Citizens in the different States.

DEAR SIR,

IN obedience to your requeſt, I have ſet down to communicate to our Society through the medium of a letter to you, a ſhort account of the *Sugar Maple-tree* of the United States, together with ſuch facts and remarks as I have been able to collect, upon the methods of obtaining Sugar from it, and upon the advantages both public and private, of this Sugar.

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The *Acer Sacharinum* of Linnæus, or the Sugar Maple-tree, grows in great quantities in the weſtern counties of all the middle ſtates of the American Union. Thoſe which grow in New-York and Pennſylvania yield the Sugar in a greater quantity than thoſe which grow on the waters of Ohio.—Theſe trees are generally found mixed with the Beech,[a] Hemlock,[b] White and Water Aſh,[c] the Cucumber tree,[d] Linden[e] Aſpen,[f] Butter Nut,[g] and Wild Cherry trees.[h] They ſometimes appear in groves covering five or ſix acres in a body, but they are more commonly interſperſed with ſome or all of the foreſt trees which have been mentioned. From 30 to 50 trees are generally found upon an acre of ground. They grow only in the richeſt ſoils, and frequently in ſtony ground. Springs of the pureſt water abound in their neighbourhood. They are, when fully grown, as tall as the white and black oaks, and from two to three feet in diameter*. They put forth a beautiful white bloſſom in the ſpring before they ſhow a ſingle leaf. The colour of the bloſſom diſtinguiſhes them from the acer rubrum, or the common maple, which affords a bloſſom of a red colour. The wood of the

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[a] Fagus Ferruginea ; [b] Pinus abies.
[c] Fraxinus Americana. [d] Magnolia acuminata.
[e] Tilia Americana. [f] Populus tremula.
[g] Juglans alba (oblonga.) [h] Prunus Virginia, of Linnæus.

* Baron La Hontan, in his voyage to North America, gives the following account of the Maple-tree in Canada. After deſcribing the black Cherry-tree, ſome of which he ays are as tall as the loftieſt oaks, and as big as a hogſhead, he adds, " the Maple-tree is much of the ſame height and bulk. It bears no reſemblance to that ſort we have in Europe."

Sugar

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Sugar Maple-tree is extremely inflammable, and is preferred upon that account by hunters and ſurveyors for fire-wood. Its ſmall branches are ſo much impregnated with ſugar as to afford ſupport to the cattle, horſes, and ſheep of the firſt ſettlers during the winter, before they are able to cultivate forage for that purpoſe. Its aſhes afford a great quantity of pot aſh, exceeded by few, or perhaps by none, of the trees that grow in the woods of the United States.

The tree is ſuppoſed to arrive at its full growth in the woods in twenty years.

It is not injured by tapping; on the contrary, the oftener it is tapped, the more ſyrup is obtained from it. In this reſpect it follows a law of animal ſecretion. A ſingle tree had not only ſurvived, but flouriſhed after *forty-two* tappings in the ſame number of years. The effects of a yearly diſcharge of ſap from the tree, in improving and increaſing the ſap, is demonſtrated from the ſuperior excellence of thoſe trees which have been perforated in an hundred places, by a ſmall woodpecker which feeds upon the ſap. The trees, after having been wounded in this way, diſtil the remains of their juice on the ground, and afterwards acquire a black colour. The ſap of theſe trees is much ſweeter to the taſte than that which is obtained from trees which have not been previouſly wounded, and it affords more ſugar.

From twenty-three gallons and one quart of ſap, procured in twenty hours from only two of theſe dark coloured trees, Arthur Noble, Eſq. of the State of New-York obtained four pounds and thirteen ounces of good grained ſugar.

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A tree of an ordinary ſize yields in a good ſeaſon from twenty to thirty gallons of ſap, from which are made from five to ſix pounds of ſugar. To this there are ſometimes remarkable exceptions. Samuel Low, Eſq. a juſtice of peace in Montgomery county, in the State of New-York informed Arthur Noble, Eſq. that he had made twenty pounds and one ounce of ſugar between the 14th and 23d of April, in the year 1789, from a ſingle tree that had been tapped for ſeveral ſucceſſive years before.

From the influence which culture has upon foreſt and other trees, it has been ſuppoſed, that by tranſplanting the Sugar Maple-tree into a garden, or by deſtroying ſuch other trees as ſhelter it from the rays of the ſun, the quantity of the ſap might be increaſed, and its quality much improved. I have heard of one fact which favours this opinion. A farmer in Northampton county in the State of Pennſylvania, planted a number of theſe trees above twenty years ago in his meadow, from *three* gallons of the ſap of which he obtains every year a pound of ſugar. It was obſerved formerly, that it required *five* or *ſix* gallons of the ſap of the trees which grow in the woods to produce the ſame quantity of ſugar.

The ſap diſtils from the *wood* of the tree. Trees which have been cut down in the winter for the ſupport of the domeſtic animals of the new ſettlers, yield a conſiderable quantity of ſap as ſoon as their trunks and limbs feel the rays of the ſun in the ſpring of the year.

It is in conſequence of the ſap of theſe trees being equally diffuſed through every part of them, that they live three years after they are *girdled*, that is, after a circular inciſion is made through the bark into the ſubſtance of the tree for the purpoſe of deſtroying it.

It is remarkable that graſs thrives better under this tree in a meadow, than in ſituations expoſed to the conſtant action of the ſun.

The ſeaſon for tapping the trees is in February, March, and April, according to the weather which occurs in theſe months.

Warm days and *froſty* nights are moſt favourable to a plentiful diſcharge of ſap.* The quantity obtained in a day from a tree, is from five gallons to a pint, according to the greater or leſs heat of the air. Mr. Lowe informed Arthur Noble, Eſq. that he obtained near three and twenty gallons of ſap in one day (April 14, 1789,) from the ſingle tree which was before mentioned. Such inſtances of a profuſion of ſap in ſingle trees are however not very common.

There is always a ſuſpenſion of the diſcharge of ſap in the night if a froſt ſucceed a warm day.

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* The influence of the weather in increaſing and leſſening the diſcharge of the ſap from trees is very remarkable.

Dr. Tonge ſuppoſed long ago (Philoſophical Tranſactions, No. 68) that changes in the weather of every kind might be better aſcertained by the diſcharge of ſap from trees than by weather glaſſes. I have ſeen a journal of the effects of heat, cold, moiſture, drought and thunder upon the diſcharges from the ſugar trees, which diſpoſes me to believe that there is ſome foundation for Dr. Tonge's opinion.

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The perforation in the tree is made with an axe or an auger. The latter is preferred from experience of its advantages. The auger is introduced about three-quarters of an inch, and in an aſcending direction (that the ſap may not be frozen in a ſlow current in the mornings or evenings) and is afterwards deepened gradually to the extent of two inches. A ſpout is introduced about half an inch into the hole, made by this auger, and projects from three to twelve inches from the tree. The ſpout is generally made of the Sumach [a] or Elder, [b] which generally grows in the neighbourhood of the ſugar trees. The tree is firſt tapped on the *South* ſide; when the diſcharge of its ſap begins to leſſen, an opening is made on the *North* ſide, from which an increaſed diſcharge takes place. The ſap flows from four to ſix weeks, according to the temperature of the weather. Troughs large enough to contain three or four gallons made of white pine, or white aſh, or of dried water aſh, aſpen, linden, poplar, [c] or common maple, are placed under the ſpout, to receive the ſap, which is carried every day to a large receiver, made of either of the trees before mentioned. From this receiver it is conveyed, after being ſtrained, to the boiler.

To preſerve the ſap from rain and impurities of all kinds, it is a good practice to cover the troughs with a concave board, with a hole in the middle of it.

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[a] Rhus. [b] Sambucus canadenſis.

[c] Liriodendron Tulipifera.

It remains yet to be determined whether ſome artificial heat may be applied ſo as to increaſe the quantity and improve the quality of the ſap. Mr. Noble informed me, that he ſaw a tree, under which a farmer had accidently burnt ſome bruſh, which dropped a thick heavy ſyrup reſembling melaſſes. This fact may probably lead to ſomething uſeful hereafter.

During the remaining part of the ſpring months, as alſo in the ſummer, and in the beginning of autumn, the Maple-tree yields a thin ſap, but not fit for the manufactory of ſugar. It affords a pleaſant drink in harveſt, and has been uſed inſtead of rum, in ſome inſtances, by thoſe farmers in Connecticut, whoſe anceſtors have left to them here and there a Sugar Maple-tree, (probably to ſhade their cattle,) in all their fields. Mr. Bruce deſcribes a drink of the ſame kind, prepared by the inhabitants of Egypt, by infuſing the ſugar cane in water, which he declares to be "the moſt refreſhing drink in the world."*

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* Baron La Hontan gives the following account of the ſap of the ſugar Maple-tree, when uſed as a drink, and of the manner of obtaining it. "The tree yields a ſap which has a much pleaſanter taſte than the beſt lemonade or cherry water, and makes the wholeſomeſt drink in the world. This liquor is drawn by cutting the tree two inches deep in the wood, the cut being made ſloping to the length of ten or twelve inches, at the lower end of this gaſh a knife is thruſt into the tree ſlopingly, ſo that the water runs along the cut or gaſh, as through a gutter, and falls upon the knife, which has ſome veſſel placed underneath to receive it. Some trees will yield five or ſix bottles of this water in a day; and ſome inhabitants of Canada might draw twenty hogſheads of it in one day, if they would thus cut and notch all the Maple-trees of their reſpective plantations. The gaſh does no

There are three methods of reducing the ſap to ſugar.

1. By *freezing it.* This method has been tried for many years, by Mr. Obadiah Scott, a farmer in Luzerne county in this State, with great ſucceſs. He ſays that one half of a given quantity of ſap reduced in this way, is better than one third of the ſame quantity reduced by boiling. If the froſt ſhould not be intenſe enough, to reduce the ſap to the graining point, it may afterwards be expoſed to the action of the fire for that purpoſe.

2. By *ſpontaneous evaporation.* The hollow ſtump of a Maple-ſugar tree, which had been cut down in the ſpring, and which was found ſome time afterwards filled with ſugar, firſt ſuggeſted this method of obtaining ſugar to our farmers. So many circumſtances of cold and dry weather, large and flat veſſels, and above all ſo much time is neceſſary to obtain ſugar, by either of the above methods, that the moſt general method among our farmers is to obtain it,

3. By *boiling.* For this purpoſe the following facts, which have been aſcertained by many experiments, deſerve attention.

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harm to the tree. Of this ſap they make ſugar and ſyrup which is ſo valuable that there can be no better remedy for fortifying the ſtomach, 'tis but few of the inhabitants that have the patience to make them, for as common things are ſlighted, ſo there are ſcarce any body but children that give themſelves the trouble of gaſhing theſe trees."

1. The ſooner the ſap is boiled, after it is collected from the tree, the better. It ſhould never be kept longer than twenty-four hours before it is put over the fire.

2. The larger the veſſel in which the ſap is boiled, the more ſugar is obtained from it.

3. A copper veſſel affords a ſugar of a fairer colour than an iron veſſel.

The ſap flows into wooden troughs from which it is carried and poured into ſtore troughs or large ciſterns, in the ſhape of a canoe or large manger, made of white aſh, linden, baſs, wood, or white pine, from which it is conveyed to the kettle in which it is to be boiled. Theſe ciſterns, as well as the kettle, are generally covered by a ſhed to defend the ſap from the rain. The ſugar is improved by ſtraining the ſap through a blanket or cloth, either before or after it is half boiled. Butter, hog's lard, or tallow, are added to the ſap in the kettle to prevent its boiling over, and lime, eggs, or new milk, are mixed with it in order to clarify it. I have ſeen clear ſugar made without the addition of either of them. A ſpoonful of ſlacked lime, the white of one egg, and a pint of new milk are the uſual proportions of theſe articles which are mixed with fifteen gallons of ſap. In ſome ſamples which I have lately ſeen of maple-ſugar clarified with each of the above articles, that in which milk alone was uſed, had an evident ſuperiority over the others, in point of colour.

The ſugar, after being ſufficiently boiled, is *grained* and *clayed*, and afterwards *refined*, or converted

verted into loaf ſugar. The methods of conducting each of theſe proceſſes is ſo nearly the ſame with thoſe which are uſed in the manufactory of Weſt-India ſugar, and are ſo generally known, that I need not ſpend any time in deſcribing them.

It has been a ſubject of inquiry, whether the maple-ſugar might not be improved in its quality, and increaſed in its quantity, by the eſtabliſhment of boiling houſes in the ſugar maple country to be conducted by *aſſociated* labour. From the ſcattered ſituation of the trees, the difficulty of carrying the ſap to a great diſtance, and from the many expences which muſt accrue from ſupporting labourers and horſes in the woods, in a ſeaſon of the year in which natureaffords no ſuſtenance to man or beaſt, I am diſpoſed to believe that the moſt productive method both in quantity and profit of obtaining this ſugar will be by the labour of private families. For a great number of years, many hundred private families in New-York and Pennſylvania, have ſupplied themſelves plentifully with this ſugar during the whole year. I have heard of many families who have made from two to four hundred pounds in a year; and of one man who ſold ſix hundred pounds, all made with his own hands in one ſeaſon.*

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* *The following receipt publiſhed by William Cooper, Eſq. in the Albany Gazette fully eſtabliſhed this fact.*

"Received, Cooper's Town, April 30th, 1790, of William Cooper, ſixteen pounds, for ſix hundred and forty pounds of ſugar made with *my own hands,* without any aſſiſtance, in leſs than four weeks, beſides attending to the other buſineſs of my farm, as providing fire wood, taking care of the cattle, &c. John Nicholls. Witneſs R. Smith."

A ſingle family, conſiſting of a man and his two ſons, on the maple ſugar lands, between the Delaware and Suſquehannah, made 1800lb. of maple ſugar in one ſeaſon.

Not

Not more knowledge is neceſſary for making this ſugar than is required to make ſoap, cyder, beer, ſour trout, &c. and yet one or all of theſe are made in moſt of the farm houſes of the United States. The kettles and other utenſils of a farmer's kitchen, will ſerve moſt of the purpoſes of making ſugar, and the time required for the labour, (if it deſerves that name) is at a ſeaſon when it is impoſſible for the farmer to employ himſelf in any ſpecies of agriculture. His wife and all his children above ten years of age, moreover, may aſſiſt him in this buſineſs, for the profit of the weakeſt of them is nearly equal to that of a man, when hired for that purpoſe.

A comparative view of this ſugar has been frequently made with the ſugar which is obtained from the Weſt-India ſugar cane, with reſpect to its *quality*, *price*, and the poſſible or probable *quantity* that can be made of it in the United States, each of which I ſhall conſider in order.

1. The *quality* of this ſugar is neceſſarily better than that which is made in the Weſt-Indies. It is prepared in a ſeaſon when not a ſingle inſect exiſts to feed upon it, or to mix its excretions with it, and before a particle of duſt, or of the pollen of plants, can float in the air. The ſame obſervation cannot be applied to the Weſt-India ſugar. The inſects and worms which prey upon it, and of courſe mix with it, compoſe a page in a nomenclature of natural hiſtory. I ſhall ſay nothing of the hands which are employed in making ſugar in the Weſt-Indies, but, that men who work for the excluſive benefit of others, are not under the ſame obligations to keep their perſons

ſon clean, while they are employed in this work; that men, women, and children are, who work excluſively for the benefit of *themſelves*, and who have been educated in the habits of cleanlineſs. The ſuperior purity of the maple ſugar is farther proved by its leaving a leſs ſediment when diſſolved in water, than the Weſt-India ſugar.

It has been ſuppoſed, that the maple ſugar is inferior to the Weſt-India ſugar in *ſtrength*. The experiments which led to this opinion, I ſuſpect have been inaccurate, or have been made with maple ſugar prepared in a ſlovenly manner. I have examined equal quantities by weight of both the grained and the loaf ſugar, in hyſon tea, and in coffee, made in every reſpect equal by the minuteſt circumſtances that could affect the quality or taſte of each of them, and could perceive no inferiority in the ſtrength of the maple ſugar. The liquors which decided this queſtion were examined at the ſame time, by Alexander Hamilton, Eſq. Secretary of the Treaſury of the United States, Mr. Henry Drinker, and ſeveral ladies, who all concurred in the above opinion.

2. Whoever conſiders that the gift of the ſugar maple trees is from a benevolent Providence, that we have many millions of acres in our country covered with them, that the tree is improved by repeated tappings, and that the ſugar is obtained by the frugal labour of a farmer's family; and at the ſame time conſiders the labour of cultivating the ſugar cane, the capitals ſunk in ſugar works, the firſt coſt of ſlaves and cattle, the expenſes of proviſions for both of them, and in

in ſome inſtances the additional expenſe of conveying the ſugar to a market, in all the Weſt-India Iſlands; will not heſitate in believing that the maple ſugar may be manufactured much cheaper, and ſold at a *leſs price* than that which is made in the Weſt-Indies.

3. The reſources for making a ſufficient *quantity* of this ſugar not only for the conſumption of the United States, but for exportation, will appear from the following facts. There are in the States of New-York and Pennſylvania alone, at leaſt ten millions of acres of land which produce the ſugar maple tree, in the proportion of thirty trees to one acre. Now ſuppoſing all the perſons capable of labour in a family to conſiſt of three, and each perſon to attend 150 trees, and each tree to yield 5lb. of ſugar in a ſeaſon, the product of the labour of 60,000 families would be 135,000,000 pounds of ſugar, and allowing the inhabitants of the United States to compoſe 600,000 families, each of which conſumed 200 pounds of ſugar in a year, the whole conſumption would be 120,000,000 pounds in a year, which would leave a balance of 15,000,000 pounds for exportation. Valuing the ſugar at $\frac{6}{90}$ of a dollar per pound, the ſum ſaved to the United States would be 8,000,000 dollars by home conſumption, and the ſum gained by exportation would be 1,000,000 dollars. The only part of this calculation that will appear improbable, is, the number of families ſuppoſed to be employed in the manufactory of the ſugar, but the difficulty of admitting this ſuppoſition will vaniſh when we conſider, that double that number of families are employed every year, in making

making cyder; the trouble, riſks and expences of which are all much greater than thoſe of making maple ſugar.

But the profit of the maple tree is not confined to its ſugar. It affords a moſt agreeable melaſſes, and an excellent vinegar. The ſap which is ſuitable for theſe purpoſes, is obtained after the ſap which affords the ſugar has ceaſed to flow, ſo that the manufactories of theſe different products of the maple tree, by *ſucceeding*, do not interfere with each other. The melaſſes may be made to compoſe the baſis of a pleaſant ſummer-beer. The ſap of the maple is moreover capable of affording a ſpirit, but we hope this precious juice will never be proſtituted by our citizens to this ignoble purpoſe. Should the uſe of ſugar in diet become more general in our country, it may tend to leſſen the inclination or ſuppoſed neceſſity for ſpirits, for I have obſerved a reliſh for ſugar in diet to be ſeldom accompanied by a love for ſtrong drink. It is the ſugar which is mixed with tea which makes it ſo generally diſagreeable to drunkards. But a diet conſiſting of a plentiful mixture of ſugar, has other advantages to recommend it, which I ſhall briefly enumerate.

1. Sugar affords the greateſt quantity of nouriſhment, in a given quantity of matter, of any ſubſtance in nature; of courſe it may be preſerved in leſs room in our houſes, and may be conſumed in leſs time, than more bulky and leſs nouriſhing aliment. It has this peculiar advantage over moſt kinds of aliment, that it is not liable to have its nutritious qualities affected by time

time or the weather: hence it is preferred by the Indians in their excurſions from home. They mix a certain quantity of maple ſugar, with an equal quantity of Indian corn, dried and powdered, in its milky ſtate. This mixture is packed in little baſkets, which are frequently wetted in travelling, without injuring the ſugar. A few ſpoons full of it mixed with half a pint of ſpring water, afford them a pleaſant and ſtrengthening meal. From the degrees of ſtrength and nouriſhment, which are conveyed into animal bodies by a ſmall bulk of ſugar, I conceive it might be given to horſes with great advantage, when they are uſed in places, or under circumſtances, which make it difficult or expenſive to ſupport them, with more bulky or weighty aliment. A pound of ſugar, with graſs or hay, I have been told, has ſupported the ſtrength and ſpirits of an horſe, during a whole day's labour in one of the Weſt-India Iſlands. A larger quantity given alone, has fattened horſes and cattle, during the war before laſt in Hiſpaniola, for a period of ſeveral months, in which the exportation of ſugar, and the importation of grain, were prevented by the want of ſhips.

2. The plentiful uſe of ſugar in diet, is one of the beſt preventatives that has ever been diſcovered, of the diſeaſes which are produced by worms. The Author of Nature ſeems to have implanted a love for this aliment in all children, as if it were on purpoſe to defend them from thoſe diſeaſes. I know a gentleman in Philadelphia, who early adopted this opinion, and who by indulging a large family of children in the

uſe of ſugar, has preſerved them all from the diſeaſes uſually occaſioned by worms.

3. Sir John Pringle has remarked, that the plague has never been known in any country where ſugar compoſes a material part of the diet of the inhabitants. I think it probable, that the frequency of malignant fevers of all kinds has been leſſened by this diet, and that its more general uſe would defend that claſs of people, who are moſt ſubject to malignant fevers, from being ſo often affected by them.

4. In the numerous and frequent diſorders of the breaſt, which occur in all countries, where the body is expoſed to a variable temperature of weather, ſugar affords the baſis of many agreeable remedies. It is uſeful in weakneſſes, and acrid defluxions, upon other parts of the body. Many facts might be adduced in favour of this aſſertion. I ſhall mention only one, which from the venerable name of the perſon, whoſe caſe furniſhed it, cannot fail of commanding attention and credit. Upon my inquiring of Dr. Franklin, at the requeſt of a friend, about a year before he died, whether he had found any relief from the pain of the ſtone, from the Blackberry Jam, of which he took large quantities, he told me that he had, but that he believed the medicinal part of the jam reſided wholly in the ſugar; and as a reaſon for thinking ſo, he added, that he often found the ſame relief, by taking about half a pint of a ſyrup prepared by boiling a little brown ſugar in water, juſt before he went to bed, that he did from a doſe of opium. It has been ſuppoſed by ſome of the early phyſicians of

our country, that the ſugar obtained from the maple tree, is more medicinal, than that obtained from the Weſt-Indian ſugar cane; but this opinion I believe is without foundation. It is preferable in its qualities to the Weſt-India ſugar only from its ſuperior *cleanlineſs*.

Caſes may occur, in which ſugar may be required in medicine, or in diet, by perſons who refuſe to be benefited, even indirectly by the labour of ſlaves. In ſuch caſes, the innocent maple ſugar will always be preferred.*

It has been ſaid, that ſugar injures the teeth, but this opinion now has ſo few advocates, that it does not deſerve a ſerious refutation.

To tranſmit to future generations, all the advantages which have been enumerated from the maple tree, it will be neceſſary to protect it by law, or by a bounty upon the maple ſugar, from being deſtroyed by the ſettlers in the maple country, or to tranſplant it from the woods, and cultivate in the old and improved parts of the United States. An orchard, conſiſting of 200 trees, planted upon a common farm, would yield more, than the ſame number of apple trees, at a diſtance from a market town. A full grown

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* Dr. Knowles, a phyſician of worthy character in London, had occaſion to recommend a diet to a patient, of which ſugar compoſed a material part. His patient refuſed to ſubmit to his preſcription, and gave as a reaſon for it, that he had witneſſed ſo much of the oppreſſion and cruelty which were exerciſed upon the ſlaves who made the ſugar, that he had made a vow never to taſte the product of their miſery as long as he lived.

tree in the woods yields five pounds of ſugar a year. If a greater expoſure of a tree to the action of the ſun, has the ſame effects upon the maple, that it has upon other trees, a larger quantity of ſugar might reaſonably be expected from each tree planted in an orchard. Allowing it to be only ſeven pounds, then 200 trees will yield 1400 pounds of ſugar, and deducting 200 from the quantity for the conſumption of the family, there will remain for ſale 1200 pounds, which at $\frac{6}{90}$ of a dollar per pound will yield an annual profit to the farmer of 80 dollars. But if it ſhould be found that the ſhade of the maple does not check the growth of grain any more than it does of graſs, double or treble that number of maple trees may be planted on every farm, and a profit proportioned to the above calculation be derived from them. Should this mode of tranſplanting the means of obtaining ſugar be ſucceſsful, it will not be a new one. The ſugar cane of the Weſt-Indies, was brought originally from the Eaſt-Indies, by the Portugueſe, and cultivated at Madeira; from whence it was tranſplanted, directly or indirectly, to all the ſugar iſlands of the Weſt-Indies.

It were to be wiſhed, that the ſettlers upon the ſugar maple lands, would ſpare the ſugar tree in clearing their lands. On a farm of 200 acres of land, according to our former calculation, there are uſually 6,000 maple trees. If only 2,000 of thoſe original and ancient inhabitants of the woods were ſuffered to remain, and each tree were to afford only five pounds of ſugar, the annual profit of ſuch a farm in ſugar alone, at the price formerly mentioned, would amount to 666 dollars,

dollars; 150 dollars of which would probably more than defray all the expences of making it, and allow a plentiful deduction for family uſe.

According to the uſual annual profit of a ſugar maple tree, each tree is worth to a farmer, two dollars and $\frac{2}{3}$ of a dollar; excluſive therefore of the value of his farm, the 2,000 ſugar maple trees alone confer a value upon it of 5,333 dollars and $\frac{30}{90}$ of a dollar.

It is ſaid, that the ſugar trees, when deprived of the ſhelter and ſupport they derive from other foreſt trees, are liable to be blown down, occaſioned by their growing in a rich, and of courſe a looſe ſoil. To obviate this, it will only be neceſſary to cut off ſome of their branches ſo as to alter its centre of gravity, and to allow the high winds to have an eaſy paſſage through them. Orchards of ſugar maple trees, which grow with an original expoſure of all their parts to the action of the ſun, will not be liable to this inconvenience.

In contemplating the preſent opening proſpects in human affairs, I am led to expect that a material ſhare of the happineſs which heaven ſeems to have prepared for a *part* of mankind will be derived from the manufactory and general uſe of maple ſugar; for the benefits which I flatter myſelf are to reſult from it, will not be confined to our own country. They will, I hope, extend themſelves to the intereſts of humanity in the Weſt Indies. With this view of the ſubject of this letter, I cannot help contemplating a ſugar maple tree with a ſpecies of affection and even veneration; for I have perſuaded myſelf to behold in it the happy means of rendering the commerce and ſlavery of our African brethren in the ſugar iſlands as unneceſſary, as it has always been inhuman and unjuſt*.

I ſhall conclude this letter by wiſhing that the patronage which you have afforded to the maple ſugar, as well as the maple tree, by your example § may produce an influence in our country, as extenſive as your reputation for uſeful ſcience and genuine patriotiſm.

From, Dear Sir, your

Sincere Friend and Obedient Servant,

BENJAMIN RUSH.

P. S. Since writing the above letter, I have procured through the friendſhip of Mr. Henry Drinker, a copy of Mr. Botham's account of the method of manufacturing ſugar in the Eaſt Indies. It is extracted from the Report of the Committee of the Britiſh Privy Council for trade, on the ſubject of the ſlave trade. I ſhall inſert in this poſtſcript only ſuch parts of it as will throw light upon the method of manufacturing the maple ſugar which has been mentioned, and to ſhow how much it is to be preferred in point of œconomy, to that which is uſed in the Weſt Indies.

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* This letter was written before the account of the war, which has lately taken place in Hiſpaniola, between the White People and their Slaves, had reached the city of Philadelphia.

§ Mr. Jefferſon uſes no other ſugar in his family, than that which is obtained from the ſugar maple tree. He has lately planted an orchard of maple trees on his farm in Virginia.

Extract from the Report of the Committee of Privy Council for trade on the ſubject of the African Slave Trade, &c. To the King, Part 3. No. 3. Mr. Botham on the mode of cultivating a Sugar Plantation in the Eaſt Indies, &c.

"HAVING been for two years in the Engliſh and French Weſt Indian Iſlands, and ſince conducted ſugar eſtates in the Eaſt Indies; before the Abolition of the Slave Trade was agitated in parliament, it may be deſirable to know that ſugar of a ſuperior quality and inferior price, to that in our Iſlands, is produced in the Eaſt Indies; and that the culture of the cane, the manufacture of the ſugar and arrack, is with theſe material advantages, carried on by free people. China, Bengal, the coaſt of Malabar, all produce quantities of ſugar and ſpirits; but as the moſt conſiderable growth of the cane is carried on near Batavia, I ſhall explain the improved manner in which ſugar eſtates are there conducted. The proprietor of the eſtate is generally a wealthy Dutchman, who has erected on it ſubſtantial mills, boiling and curing houſes. He rents this eſtate to a Chineſe, who reſides on it as a ſuperintendent; and this renter (ſuppoſing the eſtate to conſiſt of 300 or more acres) re-lets it to freemen in parcels of 50 or 60 on theſe conditions.

That they ſhall plant it in canes, and receive ſo much per pecul of 133½lbs, for every pecul of ſugar that the canes ſhall produce.

When crop time comes on, the ſuperintendent collects a ſufficient number of perſons from the adjacent towns or villages, and takes off his crop as follows:

To any ſet of tradeſmen who bring their carts and buffaloes, he agrees to give ſuch a price per pecul to cut all his crop of canes, carry them to the mill, and grind them.

A ſecond to boil them, per pecul.

A third to clay them, and baſket them for market, per pecul.

So that by this method of conducting a ſugar eſtate, the renter knows to a certainty what the produce of it will coſt him per pecul. He has not any permanent or unneceſſary expence; for when the crop is taken off, the taſkmen return to their ſeveral purſuits in the towns and villages they came from; and there only remains the cane planters who are preparing the next year's crop. This, like all other complex arts, by being divided into ſeveral branches, renders the labour cheaper, and the work more perfectly done. Only clayed ſugars are made at Batavia: theſe are in quality equal to the beſt ſort from the Weſt Indies, and are ſold ſo low from the ſugar eſtates as eighteen ſhillings ſterling, per pecul of 133½lbs. This is not the ſelling price to the trader at Batavia, as the government there is arbitrary, and ſugar ſubject to duties impoſed at will. The Shabander exacts a dollar per pecul on all ſugar exported. The price of common labour is from 9d. to 10d. per day. By the method of carrying on the ſugar eſtates, the taſkmen gain conſiderably more than this, not only from working extraordinary hours, but from being conſidered artiſts in their ſeveral branches. They do not make ſpirits on the ſugar eſtates. The melaſſes is ſent for ſale to Batavia, where one diſtillery may purchaſe the produce of an hundred eſtates. Here is a vaſt ſaving and reduction of the price of ſpirits; not as in the Weſt Indies, a diſtillery for each eſtate; many centre in one; and arrack is ſold in Batavia from 21 to 25 Rix Dollars per Leaguer of 160 gallons; ſay 8d. per gallon.

The improvement in making the cane into ſugar at Batavia keeps pace with that in its culture. Evaporation being in proportion to the ſurface, their boilers are ſet with as much of it as poſſible; the cane juice with temper ſufficient to throw up its impurities, is boiled down to the conſiſtence of a ſyrup; it is then thrown up into vats calculated to hold one boiling, then ſprinkled with two buckets of water to ſubſide its foul parts; after ſtanding ſix hours, it is let off by three pegs of different heights into a ſingle copper with one fire. It is there tempered again, boiled up and reduced to ſugar, by a gentle fire. It granulates, and the ſugar boiler dipping a wand into the copper ſtrikes it on the ſide, then drops the ſugar remaining on it into a cup of water, ſcrapes it up with his thumb nail, and is by this means able to judge to the utmoſt nicety of the ſugar having its proper degree of boiling: the vats or receivers I mentioned, are placed at the left hand of a ſet of coppers; after running off for boiling, all that is clear, the remainder is paſſed through a ſtrainer, on the outſide of the boiling houſe; what is fine is put into the copper for ſugar; the lees are reſerved for diſtilling."

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